9735 35

5060

PCT/GB 96/01330

PCT/GB 96/01330

#7

IB7128

The Patent Office
Cardiff Road
Newport
Gwent
NP9 1RH

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation and Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

PRIORITY DOCUMENT

Signed

Dated 3rd July 1996

Patents Form 1/77

Patents Act 1977
(Rule 16)

The Patent Office

1/77

21SEP95 E143815-2 000000
P01/7700 25.00

Request for grant of a patent

(See notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

THE PATENT OFFICE
20 SEP 1995
RECEIVED BY POST

The Patent Office

20 SEP 1995

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference — M95/0594/GB

2. Patent application number *(The Patent Office will fill in this part)* — **9519182.1**

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

Coats Viyella plc
28 Savile Row
London
W1X 2DD

Patents ADP number *(if you know it)*

If the applicant is a corporate body, give the country/state of its incorporation — Great Britain 6790026.001

4. Title of the invention

Strand Material

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

McNeight & Lawrence
Regent House
Heaton Lane
Stockport
Cheshire
SK4 1BS

Patents ADP number *(if you know it)* — 0001115001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

Yes

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	8
Claim(s)	
Abstract	
Drawing(s)	2

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature: McNeight & Lawrence Date: 19 09 95

12. Name and daytime telephone number of person to contact in the United Kingdom: David L McNeight 0161 480 6394

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.

b) Write your answers in capital letters using black ink or you may type them.

c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.

d) If you have answered 'Yes' Patents Form 7/77 will need to be filed.

e) Once you have filled in the form you must remember to sign and date it.

f) For details of the fee and ways to pay please contact the Patent Office.

STRAND MATERIAL

This invention relates to strand material and to methods and apparatus for making it.

In WO95/06558 is disclosed a method for making strand material comprising drawing a laminar material having a first layer of drawable material and a second layer of elastically extensible material so that the first layer extends inelastically while the second layer extends elastically so that the drawn material tends to curl into a coiled strand configuration. Strands suitable for use as weaving, knitting and sewing threads may be made from e.g. a nylon or polyester tape coated with a polyurethane elastomer. A tape having a width of some 5mm with a pre-draw thickness of 12-14 microns, of which 2 microns will be the elastic layer, will draw down and curl into a filament - like form which is suitable for textile purposes.

The tendency to curl and remain curled is ascribed to a change in the relative widths of the substrate and elastic material after drawing, the elastic material having been reduced in width less than the substrate and so tending to an equilibrium position in which it lies on the outside of the curled formation.

WO 95/06558 describes two modes of coiling, namely a single spiral, in cross-section, and a "C" formation with each end of the "C" in the form of a tight spiral - this may be symmetric or asymmetric, with one coil being larger than the other.

The fact of the elastic coating layer being on the outside of the co. structure imposes some limitations on the choice of materials and also some limitations on the use to which the strand material may be put. It is desirable that, for regular textile usage, the strand - and thus the outer elastic material-have good abrasion resistance, be non-abrasive and be readily lubricated.

The outer layer is also thin and even though it may have good abrasion resistance, it is, on account of its thinness and its exposure, liable to being rubbed off together, of course, with any colour it carries.

The present invention provides novel strand material that does not suffer from these disadvantages, and which has other advantages over prior art strand materials, and also provides methods and apparatus for making such strand material.

The invention comprises a method for making a strand material comprising drawing and twisting a tape of drawable material.

The tape may be twisted whilst being drawn, and may be false twisted.

The tape may be homogeneous throughout its cross-section. This is surprising and a marked departure from previous proposals, where it has been deemed necessary to have a bicomponent tape, and indeed one, for best results, in which one component (a substrate) is of drawable material and the other (a coating) is of elastically extensible or elastomeric material.

Of course, a strand materials produced with such a homogeneous or single component tape will not be the same in all respects as one from a bicomponent tape. However, while it may lack the degree of coiling and the permanence of some bicomponent materials, it is a useful product for a number of different end-users, and can be processed to enhance its properties, as by heat setting, which will tend to render permanent, or more permanent, the spiral cross-section configuration.

While strand material can be produced by false twisting the tape while it is being drawn, the result being a coiled tape strand with no twist, it is also possible that real twisting can be used either together with or instead of false twisting, especially perhaps when bicomponent tapes are used when the real twisting will serve to initiate the spiral formation. Real twisting can be effected in a draw twisting arrangement.

When the tape is a bicomponent tape, comprising a substrate and a coating, the coating may, as already proposed, be an elastomeric or elastically stretchable material, but the tape may be formed with a spiral cross-section with the coating on the inside of the spiral instead of the outside as thought in WO95/06558

The coating may be of a heat sealable material. It need not be elastically extensible and may be inelastically extensible. It may be of a heat seal adhesive such as polyvinylacetate copolymer. Heat sealing will serve to increase or bring about permanence of the coiled configuration. Real twist may also contribute to permanence.

The coating may incorporate a dye which is transferred to the substrate, a. by heating, the dye for such purposes possibly being a sublimable disperse dye and the strand material being heated to a temperature sufficient to sublime the dye.

The invention also comprises strand material produced by the above disclosed methods.

Strand material, methods for making the same and apparatus for carrying out the methods will now be described with reference to the accompanying drawings, in which:

Figure 1 is a cross-section through a first strand material

Figure 2 is a perspective view of second strand material with twist

Figure 3 is a cross-section through third strand material

Figure 4 is diagrammatic illustration of a first embodiment of apparatus for strand production and

Figure 5 is a diagrammatic illustration of a second embodiment of apparatus for strand production

Figures 1 to 3 illustrate strand material 11 made by methods according to the invention comprising a drawn tape 12 which is or has been twisted.

The cross-section of the strand material in each case is spiral.

Figure 1 illustrates a strand material 11 made from a homogeneous, drawable tape which has been false twisted during the drawing step and which has, as a result, readily taken up the spiral cross-section form. It is possible to produce a similar structure even without false twisting, but the false twisting positively initiates the rolling-up action which may otherwise be uncertain.

As compared to strand materials produced according to WO 95/06558, the spiral configuration may have a lesser degree of performance. This may not matter for some applications, or if a higher degree of permanence is required it may be brought about in some other fashion.

One such fashion could involve the insertion of a degree of real twist as illustrated in Figure 2. This could be achieved on a draw twisting machine such as is illustrated in Figure 5, which shows a supply 51 of undrawn tape 12 feeding to a first godet 52 then to a second godet 53 running faster than the first to draw the tape, which runs over a false twist device 54 to initiate the rolling-up action. The strand material for the second godet 53, which contains up to that point no real twist, is taken up on a ring spindle 55 which inserts real twist which runs back to the second godet 53. Either or both godets 52, 53 may be heated and a draw pin, which may be a hot draw pin, is optional in the draw zone defined by godets 52, 53.

Strand material 11 without real twist may be made on similar equipment except, of course, for the ring spindle 55, which would be replaced by a cross-winding arrangement.

Figure 3 illustrates another way of imparting permanence, or greater permanence, to the spiral cross-section formation. In this case, the undrawn tape has been coated with a heat sealing material such as a polyvinylacetate copolymer adhesive 31 which is, after drawing and rolling-up, inside the tape substrate 12. The strand material only has to be heated to a suitable temperature for the adhesive to seal the coiled layers together.

Since the adhesive 31 is on the inside of the strand material 11, the outside of the strand is the material of the substrate which can be of any drawable polymeric material and which can, therefore, be selected to have properties appropriate to the end use intended for it such, for example, as abrasion resistance and dyeability - dyeing will not be precluded or hindered by the presence of an outer elastomeric layer as taught in WO 95/06558.

A novel method for colouring strand material may be practised with strand material as described with reference to Figure 3. Broadly, this method involves including within or on the strand material or within or on a component of it, a dye which can transfer with the body of the strand material. Such a dye may be a sublimable disperse dye of the kind used in heat transfer printing and it may be transferred by heating to its sublimation point. In the strand material of Figure 3, the dye may be contained in the coating adhesive 31.

The material of Figure 3 may be made on apparatus as illustrated in Figure 4 in which a drawable tape 41 is fed from a supply reel 42 by forwarding up rollers 43 to an adhesive applicator device 44 in which adhesive 45 is picked up on a roller 46a and transferred to an applicator roller 45b in contact with which the tape 41 runs to godet 47a, then over false twist device 48 to godet 47b running faster than godet 47a to draw the tape, which is coiled by the drawing action as initiated by the false twist device 48, the thus formed strand passing to a cross wind-up arrangement 49 comprising a godet 49a and wind-up head 49b.

As described with reference to Figure 5, the godets 47a, 48c or either of them can be heated and a draw pin, which may be heated, is optional and would be used according to normal practice with the polymer material being processed.

If the adhesive contains a sublimable dye as described above, it may be arranged that any one of the heated elements referred to is at a temperature which will sublime the dye, or a special heated element may be added to that apparatus. Heat sealing and sublimation may be effected by the same heated element or by different elements as may be devised.

The real twist, of course, may be inserted in the strand material of Figure 3 as by an arrangement illustrated in Figure 5.

Depending on the nature and the amount of the heat seal adhesive employed, the strand material may be somewhat stiff for some purposes, but this can usually be rectified by a softening treatment appropriate to the materials concerned.

As with the process of WO95/06558, fibres or filaments may also b incorporated in the strand material, and single spiral or double spiral formations may be produced as well as cross-sections in which the inner part spirals one way and the outer part spirals the opposite way, the two parts being joined by a diametral bar. The strand materials may be made with or without a particular filler such as titanium dioxide or zinc oxide, but the methods described herein facilitate the production of strand material without any filler and which can, therefore, be used as a sewing thread which does not require to be dyed as it will pick up the colour of the surrounding fabric.

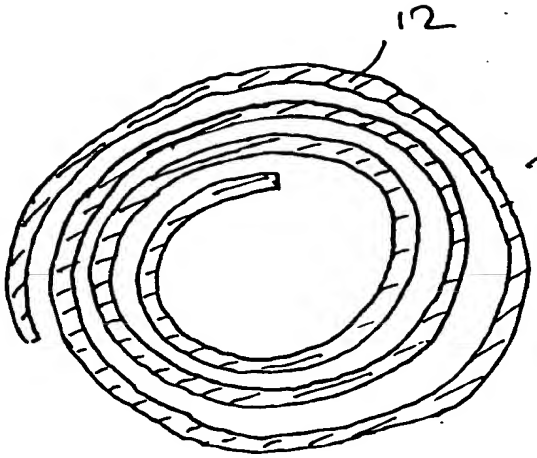

Fig 1

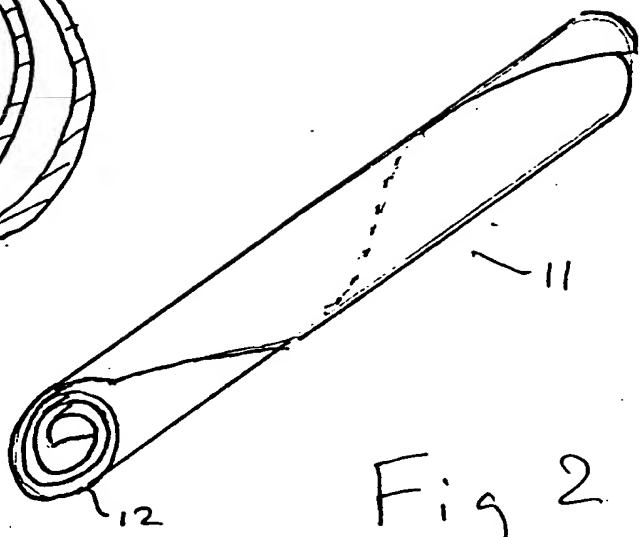

Fig 2

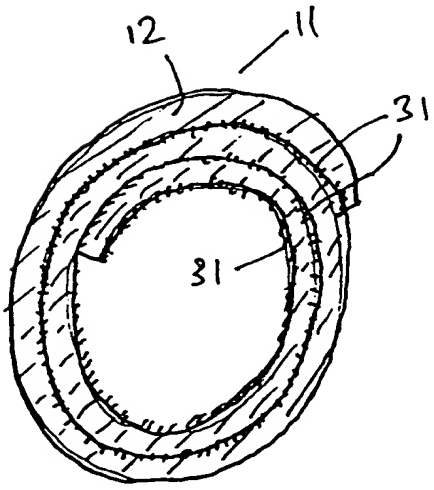

Fig 3

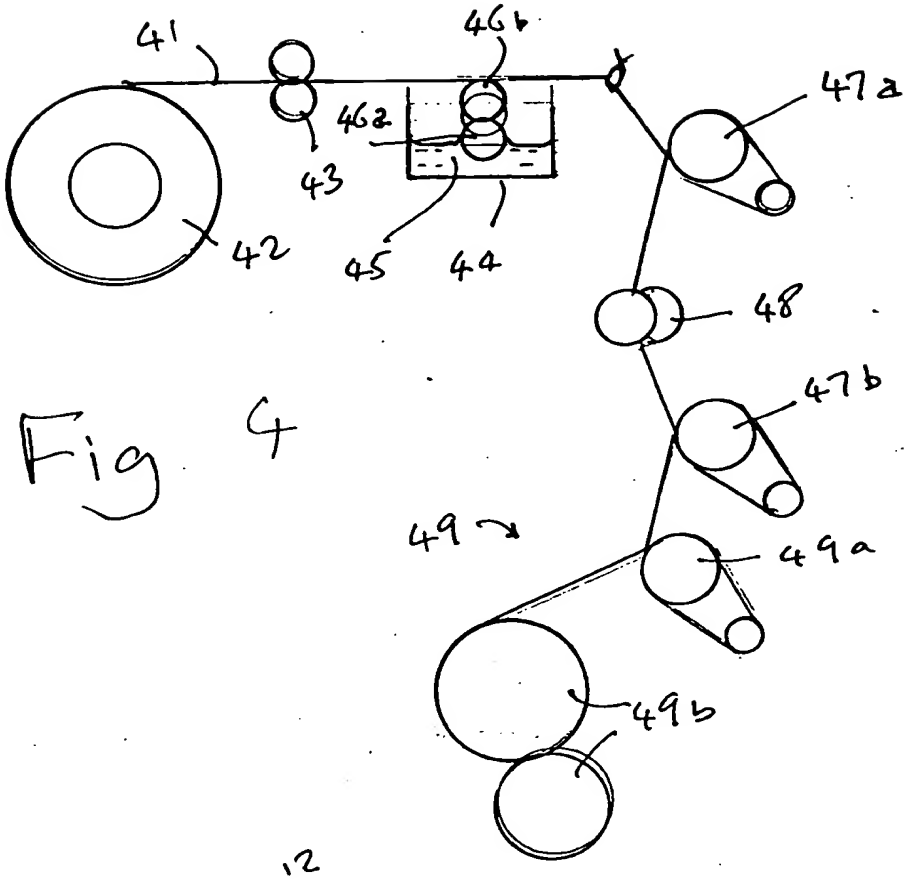

Fig 4

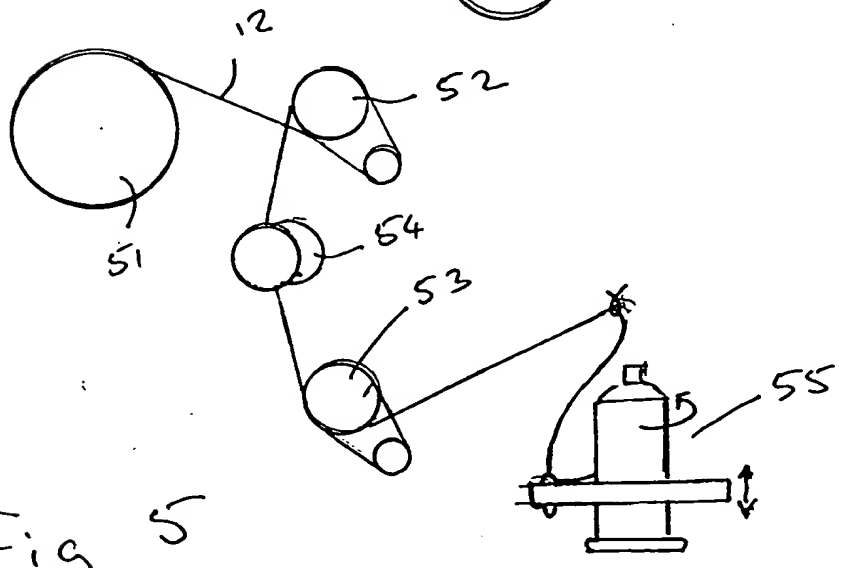

Fig 5

PCT/GB 96/01225

4-6-96

Mendenhall & Lawrence